

ABSTRACT

A substrate incorporates a mechanical cantilever resonator with passive integrated optics for motion detection. The resonator acts as a waveguide, and enables optical detection of deflection/displacement amplitude, including oscillations. In one embodiment, the cantilever comprises a silicon waveguide suspended over a substrate. A reflector structure faces a free end of the suspending cantilever, or a waveguide is supported facing the free end of the suspended cantilever to receive light transmitted through the silicon waveguide cantilever. Deflection/displacement of the cantilever results in modulation of the light received from its free end that is representative of the displacement. Ring resonators may be used to couple different wavelength light to the waveguides, allowing formation of an array of cantilevers.